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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/566,136

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Ori Hay

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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BRIARCLIFF MANOR, NY 10510

EXAMINER

CHANG, JON CARLTON

ART UNIT

PAPER NUMBER

2624

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,136	<b>Applicant(s)</b> HAY, ORI	
	<b>Examiner</b> JON CHANG	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 19-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19-21, 23-25, 28, 30-35 and 38-41 is/are rejected.
- 7) ☒ Claim(s) 22, 26-27, 29, 36, 37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/27/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                      |                                                                   |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____                                                          | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment filed December 11, 2008 has been entered and made of record.
2. Applicant's arguments have been fully considered, and are persuasive in part. Applicant's arguments with regard to claim 24 are not persuasive. With regard to the "converting" step, Applicant alleges that neither Wyman nor Betke disclose this feature. While it is agreed that Wyman does not disclose the feature, Betke does disclose it as more fully explained in the rejection below.
3. Regarding the specification, Applicant states that it was filed with recommended headings. However, in actuality, it appears that a copy of the provisional application, 60/491045, submitted as a priority document and received from the International Bureau, contains headings, but the actual filed specification from the International Bureau lacks these headings. Therefore, the current specification lacks the recommended headings.

### ***Specification***

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the specification does not provide antecedent basis for the recitation in claim 23, "reducing a number of points selectively, non-uniformly by one of prior knowledge and randomly with an oversampling of points for optimizing registration along a direction in which the slice pairs are stepped."

***Claim Objections***

5. Claims 26 and 31 objected to because of the following informalities:
- a. The language in the preamble of claim 26 is awkward. There might be a word missing.
  - b. There might be a word missing in line 2 of claim 31.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 19-20, 23, 28 and 30-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 23, at lines 10-1, recites, "reducing a number of points selectively, non-uniformly by one of prior knowledge and randomly with an oversampling of points..." This is indefinite because it is not clear whether the phrase "with an oversampling of points" is intended to be associated only with "randomly" or also with "prior knowledge." Each interpretation results in a claim with differing scope. Appropriately placed punctuation should would fix this problem.

9. In claim 28, "one of the boundary layers" is indefinite because previous to this, only one boundary layer is mentioned.

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10. All of the other claims are indefinite by reason of their dependence on claim 23.

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claims 19-20, 23, 30-35 and 38-41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

13. Claim 23 recites, “reducing a number of points...with an oversampling of points...” This is not understood, and does not seem possible. The specification does not provide adequate explanation of this process. Oversampling, as generally known in the art, increases the number of points. To reduce the number of points, it seems that undersampling would be required.

14. Similarly, claim 38 recites, “selecting a fraction of pairs of points...with an oversampling of points.” The specification does not enable selecting a fraction of points (i.e., less points) with oversampling.

15. The other claims not mentioned specifically depend from either claim 23 or claim 38.

***Claim Rejections - 35 USC § 103***

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 7,106,891 to Wyman et al. (of record, hereinafter referred to as "Wyman") and the article, Betke "*Automatic 3D Registration of Lung Surfaces in Computed Tomography Scans*", Betke et al. (of record, hereinafter referred to as "Betke").

18. Regarding Claim 24, Wyman discloses an apparatus for diagnostic imaging comprising:

storing a first diagnostic image (Column11, Lines 20-24);

storing a second diagnostic image (Column11, Lines 20-24);

automatically registering the first and second diagnostic images from the first and second image memories without operator assistance (abstract, Column7, lines 10-29)  
the step of registering including;

converting the first and second diagnostic images into feature image representations indicative of boundaries (column 9, lines 10-14; Sobel operator emphasizes edges which correspond to boundaries);

operating on the first and second feature image representations to determine an affine transform representative of misalignment of the first and second feature image representations (column 9, Lines 31-67, column 10, lines 1-4, and column 11, lines 41-62); and

operating on one of the first and second diagnostic images in accordance with the determined affine transform to register the first and second diagnostic images (column 9, lines 31-44 and column 11, lines 41-62);

concurrently displaying a corresponding pair of slices of the first and second registered diagnostic images (column 8, lines 1-6 and FIG.2); and

concurrently stepping the displayed slice pair to display additional corresponding slice pairs of the first and second images (column 8, lines 1-3, column 11, lines 20-24, and FIG.6; the prior art discloses an I/O device connected to an user interfaced system, the I/O device by definition allowing the user to have some interaction with the displayed images, thus the prior art anticipates the concurrent stepping through displayed slice pairs by a user).

19. Wyman fails to disclose that the first and second diagnostic images correspond to a common non-rigid organ, and that the feature images are indicative of the boundaries of the non-rigid organ. However, Betke discloses wherein the registering further includes: converting the first and second diagnostic images into feature image representations which are indicative of the boundary of a non-rigid organ (page 729, first paragraph; the lungs are non-rigid organs). Betke also discloses determining an affine transform to align the feature images (Page 729, third paragraph).

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20. Betke's system would permit comparison of soft organs. Modifying Wyman's system according to Betke would then improve its usefulness. Therefore, it would have been obvious to one of ordinary skill in the art to modify Wyman's system according to Betke's teaching. Additionally, one of ordinary skill in the art at the time of invention would look to prior art discussing feature-based comparison as Wyman contemplates it as an alternative method. Therefore, the combined teachings of Wyman and Betke would render Claim 9 obvious because a person of ordinary skill in the art at the time of invention would find sufficient motivation to combine the prior art references in a manner, with a reasonable expectation of success, to achieve the claimed invention.

21. With regard to claim 25, Betke discloses wherein generating the feature images includes:

- segmenting target organs in the diagnostic images (Fig.2); and
- extracting a set of features to be matched in the diagnostic image (page 729).

22. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Wyman, Betke and U.S. 7,206,462 to Betke et al. (hereinafter referred to as "the Betke Patent").

23. With regard to claim 21, neither Wyman nor Betke discloses wherein the step of determining the affine transform further includes: selecting a reduced fraction of points to be matched in the first and second feature image representations. However, the Betke patent teaches determining affine transform (Fig.20, element 362), as well as



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selecting a reduced fraction of points (Fig.3B, element 58; column 14, lines 47-61; downsampling reduces the number of points resulting in a reduced fraction of points). The reduced fraction of points is selected prior to classification (item 70, in Fig.3B) which is then eventually used in the affine transformation process (Figs. 18 and 20). It would have been obvious to implement downsampling as taught by the Betke patent in the Wyman-Betke method because it can improve processing speed (the Betke patent, column 14, lines 51-58).

#### ***Allowable Subject Matter***

24. Claims 22, 26, 27, 29, 36 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

25. Claim 28 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

#### ***Subject Matter Not Found in the Prior Art***

26. The subject matter of claims 23 and 38, as a whole, have not been found in the prior art. Allowability cannot be indicated due to an outstanding rejection under 35 U.S.C. § 112, 1<sup>st</sup> paragraph. Claim 23 requires, "determining differences between locations and surface normals of the matched points; and minimizing the deviation between the locations of the matched points." These features in combination with the

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other features of the claim are neither disclosed nor suggested by the prior art of record. Claim 38 requires, "selecting a fraction of pairs of points on the borders of the common organ...; matching the pairs of points to determine their relative closeness and a similarity of their normals; eliminating points that are displaced by more than a selected distance and whose normals fail to match within selected criteria." These features in combination with the other features of the claim are neither disclosed nor suggested by the prior art of record. Claims 19-20 and 30-35 depend from claim 23. Claims 39-41 depend from claim 38.

#### ***Citation of Pertinent Prior Art***

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 7,274,810 to Reeves et al. teaches using lung boundaries, aligning lung images, and the affine transform. It teaches slices, but does not teach concurrently displaying slice pairs and stepping a slice pair to display additional corresponding slice pairs.

#### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JON CHANG whose telephone number is (571)272-7417. The examiner can normally be reached on M-F 8:00 a.m.-6:00 p.m..

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571)272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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